

I Claim:

1. A system for molding lead articles under pressure comprising:

a source of pressurizeable molten lead;

5 a mold having a mold cavity therein, said mold maintainable at sufficiently low temperature so that a charge of molten lead located in said mold cavity solidifies to thereby form a solidified casting in said mold cavity;

a housing having a runner, said runner connecting said mold cavity to said source of pressurizeable molten lead, said runner maintainable at sufficiently high temperature to
10 maintain said molten lead in a molten state so that the mold cavity can be refilled with a fresh charge of molten lead when a solidified casting is removed therefrom; and

a shut-off valve, said shut-off valve having an open position for allowing the charge of molten lead to flow into said mold cavity and a closed position to prevent molten lead from flowing out of said runner as the molten lead in said cavity solidifies.

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2. The system of claim 1 including a control module for opening and closing said shut-off valve.

3. The system of claim 1 wherein said shut-off valve includes a slidable piston for
20 blocking the runner to prevent molten lead from being discharged into said mold cavity.

4. The system of claim 3 wherein said slidable piston is extendible into said mold.

5. The system of claim 4 wherein said slidable piston connects to a power cylinder for
25 extending and retracting said slidable piston with said piston responsive to a signal from a control module.

6. The system of claim 1 wherein only a connecting member of said mold is in engagement with a connecting member of said housing to thereby minimize a conduction of heat from the housing to said mold so that the charge of molten lead in said cavity can quickly solidify.

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7. The system of claim 1 wherein the source of pressurizeable molten lead includes a vat of molten lead, said vat of molten lead including an immersion housing at least partially immersed in the molten lead in said vat of molten lead to enable the drawing of the fresh charge of molten lead therein and a second piston in said immersion housing for pressurizing the lead therein.

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8. The system of claim 6 including a movable mold to thereby bring the connecting member of said mold into intermittent engagement with the connecting member of said housing to thereby further minimize the conduction transfer of heat between said housing and said mold.

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9. The system of claim 7 wherein the immersion housing includes an inlet positioned so as to draw molten lead from a lower portion of the vat of molten lead.

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10. The method of pressure casting a lead article comprising the steps of:
increasing the pressure of a source of molten lead sufficiently to force the molten lead to flow in a liquid state into a mold cavity;

maintaining the mold cavity at a sufficiently low temperature so that when molten lead is injected therein the molten lead solidifies therein;

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closing a runner to said mold cavity while maintaining said molten lead in a closed system to prevent entrapment of air in the molten lead as a fresh charge of molten lead is introduced into the closed system; and

removing a solidified casting from said mold cavity.

11. The method of claim 10 wherein the closing of the runner includes the step of driving a piston into said mold to thereby shut off the supply of molten lead to the mold cavity and to simultaneously increase the internal pressure of the molten lead solidifying therein to thereby reduce the volume occupied by air in said solidified casting.

12. The method of claim 11 including maintaining the molten lead in the closed system while introducing a fresh charge of molten lead into the closed system.

13. The method of claim 12 including the step of lowering the pressure on the molten lead sufficiently so that a fresh batch of molten lead can be sucked into said immersion housing.

14. The method of claim 10 including the step of bleeding air from said mold cavity as molten lead is injected into said mold cavity.

15. The method of claim 11 including the step of closing the runner to said mold cavity without allowing air into said molten lead in said runner so that the molten lead remains in a molten state.

16. The method of claim 13 including the step of removing the solidified casting from the mold cavity.

17. The method of claim 14 wherein the piston is retracted sufficiently far so as to be in disengagement with the mold but not sufficiently far as to allow molten lead to flow out of said runner.

18. The method of claim 13 wherein the step of closing the runner includes retracting a piston sufficiently far so as not to be in engagement with the mold but sufficiently far so as to maintain the piston in a blocking condition in the runner to thereby prevent molten lead from escaping from said runner.

19. The method of claim 16 wherein a further piston is retracted to draw a fresh charge of molten lead into the system.

20. A system for molding metal articles wherein the system is maintained in a closed condition to prevent air from entering the molten metal comprising:

a source of pressurizeable molten metal;

a mold having a mold cavity therein, said mold maintainable at sufficiently low temperature so that a charge of molten metal located in said mold cavity solidifies to thereby form a solidified casting in said mold cavity;

a housing having a runner for flow of molten metal therethrough, said runner connecting said mold cavity to said source of pressurizeable molten metal, said runner maintainable at sufficiently high temperature to continuously maintain said molten metal in a molten state so that the mold cavity can be refilled with a fresh charge of molten metal from the runner when a solidified casting is removed therefrom; and

a shut-off valve, said shut-off valve having an open position for allowing molten metal to flow into said mold cavity, a closed position to prevent molten metal from flowing out of said runner as the molten metal in said cavity solidifies and an intensification position to momentarily increase the pressure in the mold cavity to thereby minimize shrinkage and voids in the casting.

21. The system of claim 20 wherein the shut-off valve in the closed position includes a first closed condition wherein a piston extends into the mold and a second closed condition wherein the piston is retracted out of said mold for removal of a solidified casting therefrom.

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22. The system of claim 21 wherein the housing includes an alignment guide for said piston to ensure that said piston is maintainable in alignment with said runner.

23. The system of claim 22 wherein the mold is slidable away from said housing during the solidification of the molten metal in the mold cavity to thereby decrease a conduction transfer of heat from said housing to said mold.

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24. The system of claim 23 wherein the mold and the housing including mating members for providing a continuous inline passage between said mold cavity and said housing to enable the piston to slide therein.

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25. A closed system for molding metal articles under pressure comprising:
a source of pressurizeable molten metal, said source of pressurizeable molten metal including a vat of molten metal having an immersion housing therein with a slidable piston therein for increasing the pressure of the molten metal in the immersion housing, said immersion housing having an inlet maintainable in the lower portion of the vat of molten metal to prevent air from being drawn into the immersion housing when a fresh charge of molten metal is brought into the housing;

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a mold having a mold cavity therein for forming a part, said mold maintainable at sufficiently low temperature so that molten metal located in said mold cavity can solidify to thereby form a solidified part in said mold cavity;

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a housing having a runner, said runner forming a fluid passageway connecting said mold cavity to said source of pressurizable molten metal, said runner in said housing maintainable at sufficiently high temperature to maintain a charge of molten metal in a molten state so that the mold cavity can be refilled with the fresh charge of molten metal when a solidified casting is removed therefrom; and

a shut-off valve, said shut-off valve having an open position for allowing molten metal to flow into said mold cavity, a closed position to prevent molten metal from flowing out of said runner as the molten metal in said cavity solidifies, an intensification position to momentarily increase the pressure of the molten metal in the mold cavity to thereby minimize shrinkage and voids and a release position to allow the part to be removed from the mold while maintaining the closed system to prevent air from being introduced into the molten metal.